

June 09 2015

MEMORANDUM

SUBJECT: Evaluation of Principal Threat Waste for Dioxin in soil under 6" soil cover at Arkwood site.

FROM: Ghassan A. Khoury, MSPH, Sc.D.
Jon Rauscher, Ph.D.
Risk and Site Assessment Section (6SF-TR)

THRU: Chris Villarreal, Chief
Risk and Site Assessment Section (6SF-TR)

TO: Stephen Tzhone, RPM
Remedial AK/TX Section (6SF-RA)

Evaluation of Principal Threat Waste for Dioxin in soil under 6" soil cover at Arkwood site.

The 1991 Superfund publication entitled *A Guide to Principle Threat and Low Level Threat Wastes* (9380.3-06FS) provides guidance on definition of principal threat waste. The publication states following:

"Principal threat are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. They include liquids and other highly mobile materials (e.g., solvents) or materials having high concentrations of toxic compounds. No "threshold level" of toxicity/risk has been established to equate to "principal threat." However, where toxicity and mobility of source material combine to pose a potential risk of 10^{-3} or greater, generally treatment alternatives should be evaluated."

Applying this guidance to the Arkwood Superfund site, a concentration of 22,000 part per trillion (ppt) toxicity equivalents (TEQs) dioxin would reflect an excess upper bound lifetime cancer risk of 1×10^{-3} . This is one order of magnitude higher than the upper end of the EPA the excess upper bound lifetime cancer risk range of between 1×10^{-6} to 1×10^{-4} , that is used to determine an acceptable exposure level. If toxicity alone is considered, the soil concentrations of dioxin higher than 22,000 ppt could be considered a principal threat waste. This exposure level uses a Tier 3 toxicity value (Cal EPA toxicity value) which is the last to use in the EPA's hierarchy of toxicity values used at Superfund sites (OSWER Directive 9285.7-53). The highest soil concentration measured at Arkwood site under a 6" soil cover was recorded at 16,750 ppt. The 16,750 ppt is less than the 22,000 ppt TEQs dioxin level (cut off point for principal threat waste). Therefore the dioxin at Arkwood Superfund site is not a principal threat waste based solely on toxicity evaluation.

Although the 1991 publication did not mention the use of hazard quotients, we should consider non-cancer effects of dioxin due to the existence of the Tier 1 Integrated Risk Information System (IRIS) value. The Tier 1 IRIS non-cancer effect value was based on a human study

(reduce motility and sperm count in men exposed to dioxin as young boys). There is high confidence in the human study and is more defensible than the Tier 3 Cal EPA cancer slope factor. EPA headquarters recommended that Regions should evaluate risk from exposure to dioxin in soil based on the new non-cancer toxicity value until an IRIS value is developed for cancer effects. As such, EPA developed a Preliminary Remediation Goal of 730 ppt for dioxin in soil based on non-cancer effects for a Commercial/Industrial worker. The 730 ppt reflects a hazard quotient (HQ) of one. If we use the same logic as that used in the 1991 Superfund publication and used an order of magnitude above the EPA acceptable non-cancer HQ of 1, a dioxin soil concentration of 7,300 ppt will reflect a HQ of 10 (one order of magnitude greater than the HQ of 1). In this case the maximum value of 16,750 ppt dioxin would be greater than the 7,300 ppt level used to define a principal threat waste based upon non-cancer health effects.

The 1991 Superfund publication requires that the toxicity and mobility of the source material be considered in determining if a material is a principal threat waste or low level threat waste. The source material at the Arkwood site generally would be considered to be non-mobile due to the relatively immobility in air, soil and water (non-liquid, low volatility and high molecular weight) and is well contained. Based only on the toxicity level of the material at Arkwood site, there is some uncertainty as to whether to consider the material a principal threat waste or is a low level threat waste. Using the cancer risk, the material could be considered a low level threat waste; whereas, using the non-cancer risk, the material could be considered a principal threat waste. However, when toxicity is considered in combination with the immobility and containment of the source material under the 6" soil cover, the source material at the Arkwood site should be considered to be a low level threat waste.